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On a new Type of Reptilian Tooth (Ptychocynodon) *from the Upper Karroo Beds near Burghersdorp, Cape Colony.*

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In 1897 Dr. Kannemeyer discovered and sent to me the fragment of a tooth which is now described. He fully appreciated the scientific interest of the fossil, and I have only delayed making his discovery known in hope that the labours and acumen which have added so much to our knowledge of South-African reptiles might have been rewarded with more complete evidence of the animal.

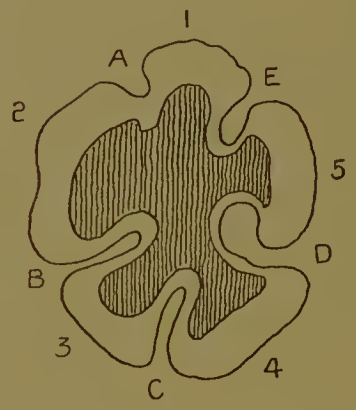
The fragment, which is less than an inch and a quarter long, appears to be a portion of a large stout tusk of a new genus of fossil reptiles with canine teeth comparable to the Dicynodont type. In transverse section it measures one inch and a half from back to front and an inch and a quarter from side to side. It was presumably long, for the decrease in transverse measurements towards the fractured extremity is very small.

This tooth differs from all genera of reptiles hitherto known in having the tooth-substance folded longitudinally into a few large flexures, which are not symmetrical and vary in size, giving rise to an angulated pulp-cavity. The appearance is that of a plastic substance which had become corrugated by compression, and, yielding towards the pulp-cavity, had acquired a complex folded structure. But in the transverse section the microscopic condition of the dentine is normal and leaves no doubt that the folding is a tooth-character of a new type differing fundamentally from that of known Labyrinthodonts. The root of the tooth exposes a five-rayed pulp-cavity. Each ray corresponds to one of the five parallel vertical convex bars or folded flutings which make the external surface of the tooth. This basal extremity is broken and weathered, showing that the tooth has long been separated from the skull. The dense tooth-substance is about two tenths of an inch thick on each of the five bars. These bars are divided from each other by narrow folds directed inward, which vary in depth and size. The walls of these inlets are thin, being less than half the thickness of the intervening tooth-substance.

Owing to strain in the undulatory movements which have affected these rocks the continuity of the thin walls of the inlets is sometimes broken, giving the pulp-cavity the appearance of opening externally. The anterior inlet A (fig. 1) is the

smallest and seareely affeets the pulp-eavity, but the other four are deeper than wide; B and C on the external border are narrower than D and E on the internal border. All are to be deseribed as eanals whieh are open externally. They are fewer and larger than the grooves on the roots of teeth

Fig. 1.



Outline of the proximal surface, showing the five bars of the tooth (1–5) and inward folds (A–E) which divide up the pulp-cavity.

of some speeies of *Ichthyosaurus*, and rather suggest the folded eondition of the teeth in genera of mammals whieh approximate to South-Afriean reptiles in parts of their skeletons.

Fig. 2.

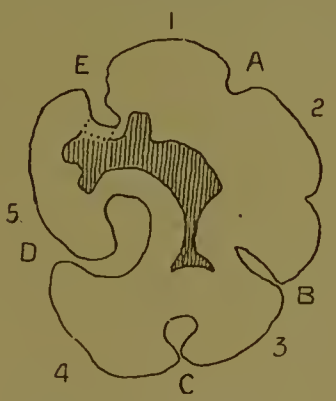
Transverse section in the middle of the specimen, showing the diminishing pulp-cavity.

To determine the strueture of the tooth more exactly it was divided transversely in the middle of its short length. The

external wall of dentine is now seen to thicken at the expense of the pulp-cavity, which has lost its five-rayed form and become more L-shaped. The inner wall of the canal E appears to be broken, but the inner walls of the other canals have thickened, especially on the external side of the tooth (fig. 2).

The distal fracture of the tooth is much more recent and shows the pulp-cavity reduced to a curved hamate form situate towards the inner side of the tooth and only two tenths of an inch wide in the middle. The inlet E is imperfectly separated from the pulp-cavity, probably from the effect of strain, though the partition of dentine between them remains as thin as in the basal section (fig. 1). The inlet D retains its comma- or flask-shaped form without decrease in size. The inlets C and B are almost entirely closed by the approximation of the lateral external walls (fig. 3). The tooth-substance in which they are contained is fully half an inch thick, but on the inner side of the tooth the walls of dentine are only from one to two tenths of an inch thick.

Fig. 3.



Distal fracture of the tooth.

These inlets have been regarded by Dr. Kannemeyer as comparable to the poison-duct in the tooth of a venomous serpent. The inlet D is essentially of this character, and although the entire tooth is to be desired before the inference can be regarded as established, it is not improbable that all the canals may be outlets for poison-glands.

Externally the five bars of the tooth are vertically ribbed with six to ten slightly elevated, blunt, parallel, linear stripes, which are stronger on the outer than on the inner side. There is a very slightly elevated girdling ridge, situate below

the transverse section, which may possibly indicate the dividing limit between the crown and the root, which I suppose to have been imbedded in the jaw. There are very faint transverse lines of growth beyond this ridge.

If the crown of the tooth were short, each lobe or bar of the tooth might be expected to terminate in a cusp, so that a complex five-cusped reptilian tooth might originate from folding extending through the root and crown, as in Mammalia like Edentates and Rodents. If the tooth is rightly interpreted as a canine, then it might be followed by molar teeth of similar complexity, and tend to show that the cuspidate character of certain mammalian and reptilian teeth may not always be due to the mechanical influences of opposing surfaces and varied movements of the jaws.

There is no distinct layer of enamel beyond a surface-skin. The calcigerous tubes of the dentine are always at right angles to the external surface, remarkably dense, straight, and parallel, always bending at the folds of the dentine as they extend inward, so that the tubes tend to be approximately parallel. There is no appreciable difference from the tube-structure in *Dicynodon*, though the tubes may be slightly larger. The species may be known as *P. pentangulatus*.